AF

DOCKET NO.: US 010123
CLIENT NO.: PHIL06-01397

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	STEPHEN HERMAN, et al.
Serial No.:	09/819,360
Filed:	March 28, 2001
For:	SYSTEM AND METHOD FOR PERFORMING SEGMENTAITON-BASED ENHANCEMENTS OF A VIDEO IMAGE
Group No.:	2614
Examiner:	B.P. Yenke

MAIL STOP APPEAL BRIEF - PATENTS
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☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 340.00

Complete if Known	
Application Number	09/819,360
Filing Date	March 28, 2001
First Named Inventor	Stephen Herman
Examiner Name	B.P. Yenke
Art Unit	2614
Attorney Docket No.	US010123

METHOD OF PAYMENT *(check all that apply)*

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FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	790	2001	395	Utility filing fee	
1002	350	2002	175	Design filing fee	
1003	550	2003	275	Plant filing fee	
1004	790	2004	395	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	

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2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

		Extra Claims		Fee from below	Fee Paid
Total Claims		-20** =		X	=
Independent Claims		- 3** =		X	=
Multiple Dependent					=

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	88	2201	44	Independent claims in excess of 3
1203	300	2203	150	Multiple dependent claim, if not paid
1204	88	2204	44	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

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FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for *ex parte* reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	430	2252	215	Extension for reply within second month	
1253	980	2253	490	Extension for reply within third month	
1254	1,530	2254	765	Extension for reply within fourth month	
1255	2,080	2255	1,040	Extension for reply within fifth month	
1401	340	2401	170	Notice of Appeal	
1402	340	2402	170	Filing a brief in support of an appeal	$340.00
1403	300	2403	150	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,370	2453	685	Petition to revive - unintentional	
1501	1,370	2501	685	Utility issue fee (or reissue)	
1502	490	2502	245	Design issue fee	
1503	660	2503	330	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17(q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	790	2809	395	Filing a submission after final rejection (37 CFR 1.129(a))	
1810	790	2810	395	For each additional invention to be examined (37 CFR 1.129(b))	
1801	790	2801	395	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	

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SUBTOTAL (3) ($) 340.00

SUBMITTED BY				(Complete *(if applicable)*)
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Signature				*Date* Oct. 26, 2004

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Alexandria, VA 22313-1450

Sir:

APPEAL BRIEF

The Appellants have appealed to the Board of Patent Appeals and Interferences from the decision of the Examiner dated May 20, 2004, finally rejecting Claims 1-21. The Appellants filed a Notice of Appeal on August 20, 2004. The Appellants respectfully submit this brief on appeal with the statutory fee of $340.00.

REAL PARTY IN INTEREST

This patent application is currently owned by Philips Electronics North America Corporation as indicated by an assignment recorded on June 14, 2001 in the Assignment Records of the U.S. Patent and Trademark Office at Reel 011660, Frame 0732.

RELATED APPEALS AND INTERFERENCES

There are no known appeals or interferences that will directly affect, be directly affected by, or have a bearing on the Board's decision in this pending appeal.

STATUS OF CLAIMS

Claims 1-21 have been rejected pursuant to an Office Action dated May 20, 2004. Claims 1-21 are presented for appeal. A copy of all pending claims is provided in Appendix A.

STATUS OF AMENDMENTS

A response to the Final Office Action was faxed to the Examiner on July 20, 2004. The Appellant is unaware of any Advisory Action received after the faxing of the July 20, 2004 response. The Appellant is also unaware as to the status of the response..

SUMMARY OF CLAIMED SUBJECT MATTER

According to one embodiment, an apparatus performs segmentation-based enhancements of a video image by initially storing video frames of an incoming video signal in an input buffer 210. A segmentation controller 222 segments a first stored frame into a plurality of segments, in which each segment includes a plurality of pixels having at least one common property. (*Application, Figures 2 and 3; Page 13, Line 8 – Page 14, Line 6; Page 16, Line 18 – Page 17, Line 5; Page 18, Lines 9-16; Page 20, Line 19 – Page 21, Line 2; and Page 21, Lines 4-12*). An image processor 220 calculates a probability function associated with at least one pixel in the first stored frame. The probability function indicates a probability that the at least one pixel belongs within a first selected one of the segments. (*Application, Figures 2 and 3; Page 18, Lines9-16; Page 19, Line 5 – Page 20, Line 18; and Page 21, Lines 2-3*). An enhancement controller 224 enhances a parameter of the at least one pixel as a function of the probability function. (*Application, Figures 2 and 3; Page 14, Lines 6-13; Page 17, Lines 5-8; Page 18, Line 17 – Page 19, Line 4; Page 20, Lines 13-14; and Page 21, Lines 13-22*).

In another embodiment, a television receiver 110 includes demodulation circuitry for receiving an incoming RF television signal and generating therefrom a baseband video signal capable of being displayed as a plurality of pixels on a video display, and post processing circuitry 140 for receiving the baseband video signal from the demodulation circuitry and performing segmentation-based enhancements of a video image. (*Application, Figure 1; Page 12, Lines 4-14; and Page 13, Lines 3-12*). The post processing circuitry 140 includes an input buffer 210 for storing video frames

of an incoming video signal, and a segmentation controller 222 for segmenting a first stored frame into a plurality of segments, in which each segment includes a plurality of pixels having at least one common property. (*Application, Figures 2 and 3; Page 13, Line 8 – Page 14, Line 6; Page 16, Line 18 – Page 17, Line 5; Page 18, Lines 9-16; Page 20, Line 19 – Page 21, Line 2; and Page 21, Lines 4-12*). The post processing circuitry further includes an image processor 220 for calculating a probability function associated with at least one pixel in the first stored frame. The probability function indicates a probability that the at least one pixel belongs within a first selected one of the segments. (*Application, Figures 2 and 3; Page 18, Lines9-16; Page 19, Line 5 – Page 20, Line 18; and Page 21, Lines 2-3*). The post processing circuitry also includes an enhancement controller 224 for enhancing a parameter of the at least one pixel as a function of the probability function. (*Application, Figures 2 and 3; Page 14, Lines 6-13; Page 17, Lines 5-8; Page 18, Line 17 – Page 19, Line 4; Page 20, Lines 13-14; and Page 21, Lines 13-22*).

In a further embodiment, a method of performing segmentation-based enhancements of a video image includes the steps of storing video frames of an incoming video signal in an input buffer (step 405), and segmenting a first stored frame into a plurality of segments, in which each segment includes a plurality of pixels having at least one common property (step 415). (*Application, Figure 4; Page 20, Line 19 – Page 21, Line 2; and Page 21, Lines 4-12*). In addition, the method includes the step of calculating a probability function associated with at least one pixel in the first stored frame (step 405). The probability function indicates a probability that the at least one pixel belongs within a first selected one of the segments. (*Application, Figure 4; Page 21, Lines 2-3*). The method

further includes the step of enhancing a parameter of the at least one pixel as a function of the probability function (step 420). (*Application, Figure 4; Page 21, Lines 13-22*).

In an additional embodiment, computer-executable instructions stored on a computer-readable medium are capable of performing segmentation-based enhancements of a video image. The computer-executable instructions include the steps of storing video frames of an incoming video signal in an input buffer, and segmenting a first stored frame into a plurality of segments, in which each segment includes a plurality of pixels having at least one common property. (*Application, Figures 2 and 3; Page 13, Line 8 – Page 14, Line 6; Page 16, Line 18 – Page 17, Line 5; Page 18, Lines 9-16; Page 20, Line 19 – Page 21, Line 2; and Page 21, Lines 4-12*). In addition, the computer-executable instructions include the step of calculating a probability function associated with at least one pixel in the first stored frame. The probability function indicates a probability that the at least one pixel belongs within a first selected one of the segments. (*Application, Figures 2 and 3; Page 18, Lines9-16; Page 19, Line 5 – Page 20, Line 18; and Page 21, Lines 2-3*). The computer-executable instructions further include the step of enhancing a parameter of the at least one pixel as a function of the probability function. (*Application, Figures 2 and 3; Page 14, Lines 6-13; Page 17, Lines 5-8; Page 18, Line 17 – Page 19, Line 4; Page 20, Lines 13-14; and Page 21, Lines 13-22*).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

(1) Claims 1-6 and 15-21 stand rejected under 35 U.S.C. § 102(b) as being anticipated by European Patent Application EP 0 844 582 to Khosravi et al. ("*Khosravi*").

(2) Claims 8-13 stand rejected under 35 U.S.C. § 103(a) ad being unpatentable over *Khosravi.*

(3) Claims 7 and 14 stand rejected under 35 U.S.C. § 103(a) ad being unpatentable over *Khosravi* in view of U.S. Patent Application No. 2003/0002732 to Gossett et al. ("*Gossett*")

ARGUMENT

GROUND 1 – REJECTION UNDER 35 U.S.C. § 102

The rejection of Claims 1-6 and 15-21 under 35 U.S.C. § 102(b) is improper and should be withdrawn.

A. OVERVIEW

Claims 1-6 and 15-21 stand rejected under 35 U.S.C. § 102(b) as being anticipated by European Patent Application EP 0 844 582 to Khosravi et al. ("*Khosravi*")

A copy of the claims is provided in Appendix A. A copy of *Khosravi* is provided in Appendix B.

B. STANDARD

A prior art reference anticipates the claimed invention under 35 U.S.C. § 102 only if every element of a claimed invention is identically shown in that single reference, arranged as they are in the claims. (*MPEP § 2131; In re Bond, 910 F.2d 831, 832, 15 U.S.P.Q.2d 1566, 1567 (Fed. Cir. 1990)*). Anticipation is only shown where each and every limitation of the claimed invention is found in a single prior art reference. (*MPEP § 2131; In re Donohue, 766 F.2d 531, 534, 226 U.S.P.Q. 619, 621 (Fed. Cir. 1985)*).

C. THE *KHOSRAVI* REFERENCE

Khosravi discloses a method for detecting a human face in a video image using a model-

based approach. The foreground regions of the video image are segmented from the background regions of the video image. (*Khosravi, p. 3, lines 25-32*). Multiple models are generated, for example, a model of the foreground region as containing one person and another model of the foreground region as containing two people. (*Khosravi, p. 3, lines 33-35*). For each model, a probability function is evaluated, representing the likelihood that the model correctly describes the number of people in the image. (*Khosravi, p. 3, lines 35-37*).

A model is defined by a list of parameters (x_0, x_1,...x_i). The parameters are horizontal coordinates that define the left and right boundaries of vertical strips of the video image. Thus, a one-person model has two parameters (x_0, x_1) and a two-person model has three parameters (x_0, x_1, x_2). (*See Khosravi, p. 4, lines 29-33, and Figs. 9A and 9D*). For each model, its parameters, (x_0, x_1,...x_i), are adjusted iteratively to maximize the model's likelihood function $P(O(x,y)|\lambda_i)$. (*Khosravi, p. 5, lines 1-2*). The observation O(x,y) represents the intensity of the pixel at location (x,y) and λ_i represents the i-th model. (*Khosravi, p. 4, line 15 and lines 29-31*).

To calculate a model's likelihood function, *Khosravi* attempts to fit an ellipse around the upper portion of the foreground region in each vertical strip defined by the model. This ellipse is presumed to define the area of the video image containing a head. (*Khosravi, p. 6, lines 37-38*). The pixels that are within this ellipse are classified as 'face' pixels and the pixels that are outside the ellipse (but still within the ellipse's bounding rectangle) are classified as 'non-face' pixels. (*Khosravi, p. 5, lines 14-16*). A model's likelihood function $P(O(x,y)|\lambda_i)$ is a measure of the percentage of foreground pixels within the 'face' region and background pixels within the 'non-face'

region. (*Khosravi, p. 5, lines 16-19*). Thus, the likelihood function $P(O(x,y)|\lambda_i)$ is a measure over all the pixels within the bounding rectangle of the chosen ellipse.

D. CLAIMS 1-6 AND 15-21

Claim 1, taken as representative of independent Claims 1, 15 and 19 recites an apparatus for performing segmentation-based enhancements of a video image, which includes:

> an input buffer for storing video frames of an incoming video signal;
>
> a segmentation controller capable of segmenting a first stored frame into a plurality of segments, each of said plurality of segments comprising a plurality of pixels having at least one common property;
>
> an image processor capable of calculating a probability function associated with at least one pixel in said first stored frame, said probability function indicating a probability that said at least one pixel belongs within a first selected one of said plurality of segments; and
>
> an enhancement controller capable of enhancing a parameter of said at least one pixel as a function of said probability function of said at least one pixel.

The Examiner has failed to show that *Khosravi* anticipates the element of "enhancing a parameter of said at least one pixel as a function of [a] probability function," in which the probability function measures "a probability that said at least one pixel belongs within a first selected one of said plurality of segments," as recited in Claims 1, 15 and 19.

Where the likelihood function $P(O(x,y)|\lambda_i)$ of the *Khosravi* reference is a bulk measure over all the pixels within a chosen rectangle and determines whether an ellipse fits a portion of the foreground region of the image, the probability function recited in Claims 1, 15 and 19 is a measure of whether an individual pixel belongs within a segment of a video image and determines the level of enhancement applied to that pixel.

Furthermore, the Examiner asserts in the Final Office Action of May 20, 2004 that *Khosravi* describes controlling parameters based on a probability computation to ensure the best segmentation of pixels in an image, thereby teaching the limitation of Claims 1, 15 and 19 of enhancing a parameter of a pixel. (*See Final Office Action, p. 9, Section a)*). The Applicants respectfully submit that the parameters being controlled in the *Khosravi* reference are parameters of a model, not parameters of a pixel. Furthermore, the attribute whose best value is being sought is a bulk measure of how well an ellipse fits the foreground region within a rectangle, taken over all the pixels within that rectangle.

Thus, the *Khosravi* reference does not teach a probability function indicating a probability that a pixel belongs within a selected one of a plurality of segments. Nor does it teach enhancing a parameter of the pixel as a function of the probability function.

In order to reject independent Claims 1, 15 and 19 (and their dependent claims), the Examiner must show that Khosravi anticipates each and every element recited in Claims 1, 15 and 19 (and their dependent claims). The Examiner has not met that burden. For these reasons, the Examiner has not shown that *Khosravi* anticipates the Appellants' invention as recited in Claims 1, 15 and 19 (and their dependents).

Accordingly, the Appellants respectfully request that the § 102 rejection of Claims 1-6 and 15-21 be withdrawn and that Claims 1-6 and 15-21 be passed to allowance.

GROUND 2 – REJECTION UNDER 35 U.S.C. § 103 USING *KHOSRAVI*

The rejection of Claims 8-13 under 35 U.S.C. § 103(a) is improper and should be withdrawn.

A. OVERVIEW

Claims 8-13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Khosravi*.

B. STANDARD

In *ex parte* examination of patent applications, the Patent Office bears the burden of establishing a *prima facie* case of obviousness. (*MPEP § 2142; In re Fritch, 972 F.2d 1260, 1262, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992)*). The initial burden of establishing a *prima facie* basis to deny patentability to a claimed invention is always upon the Patent Office. (*MPEP § 2142; In re Oetiker, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); In re Piasecki, 745 F.2d 1468, 1472, 223 U.S.P.Q. 785, 788 (Fed. Cir. 1984)*). Only when a *prima facie* case of obviousness is established does the burden shift to the Appellant to produce evidence of nonobviousness. (*MPEP § 2142; In re Oetiker, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); In re Rijckaert, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993)*). If the Patent Office does not produce a *prima facie* case of unpatentability, then without more the Appellant is entitled to grant of a patent. (*In re Oetiker, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); In re Grabiak, 769 F.2d 729, 733, 226 U.S.P.Q. 870, 873 (Fed. Cir. 1985)*).

A *prima facie* case of obviousness is established when the teachings of the prior art itself

suggest the claimed subject matter to a person of ordinary skill in the art. (*In re Bell, 991 F.2d 781, 783, 26 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1993)*). To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed invention and the reasonable expectation of success must both be found in the prior art, and not based on Appellant's disclosure. (*MPEP § 2142*).

C. CLAIMS 8-13

Claim 8 recites a television receiver that includes:

demodulation circuitry capable of receiving an incoming RF television signal and generating therefrom a baseband video signal capable of being displayed as a plurality of pixels on a video display; and

post processing circuitry, coupled to an output of said demodulation circuitry and receiving therefrom said baseband video signal, capable of performing segmentation-based enhancements of a video image, said post processing circuitry comprising:

an input buffer for storing video frames of an incoming video signal;

a segmentation controller capable of segmenting a first stored frame into a plurality of segments, each of said plurality of segments comprising a plurality of pixels having at least one common property;

an image processor capable of calculating a probability function associated with at least one pixel in said first stored frame, said probability function indicating a probability that said at least one pixel belongs within a first selected one of said plurality of segments; and

an enhancement controller capable of enhancing a parameter of said at least one pixel as a function of said probability function of said at least one pixel.

The Examiner has failed to show that *Khosravi* anticipates the element of "enhancing a parameter of said at least one pixel as a function of [a] probability function," in which the probability function measures "a probability that said at least one pixel belongs within a first selected one of said plurality of segments," as recited in Claim 8.

As described above, *Khosravi* fails to disclose, teach or suggest a probability function indicating a probability that a pixel belongs within a selected one of a plurality of segments, as recited in Claim 8. In addition, *Khosravi* does not disclose, teach or suggest enhancing a parameter of the pixel as a function of the probability function, as also recited in Claim 8.

For these reasons, the Examiner has not shown that *Khosravi* discloses, teaches or suggests the Appellants' invention as recited in Claim 8 (and its dependent claims). As a result, the Examiner has failed to establish a *prima facie* case of obviousness against Claims 8-14. Accordingly, the Appellants respectfully request that the § 103 rejection of Claims 8-13 be withdrawn and that Claims 8-13 be passed to allowance.

GROUND 3 – REJECTION UNDER 35 U.S.C. § 103 USING *KHOSRAVI* AND *GOSSETT*

The rejection of Claims 7 and 14 under 35 U.S.C. § 103(a) is improper and should be withdrawn.

A. OVERVIEW

Claims 7 and 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Khosravi* in view of *Gossett*.

B. STANDARD

In *ex parte* examination of patent applications, the Patent Office bears the burden of establishing a *prima facie* case of obviousness. (*MPEP § 2142; In re Fritch, 972 F.2d 1260, 1262, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992)*). The initial burden of establishing a *prima facie* basis to deny patentability to a claimed invention is always upon the Patent Office. (*MPEP § 2142; In re Oetiker, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); In re Piasecki, 745 F.2d 1468, 1472, 223 U.S.P.Q. 785, 788 (Fed. Cir. 1984)*). Only when a *prima facie* case of obviousness is established does the burden shift to the Appellant to produce evidence of nonobviousness. (*MPEP § 2142; In re Oetiker, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); In re Rijckaert, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993)*). If the Patent Office does not produce a *prima facie* case of unpatentability, then without more the Appellant is entitled to grant of a patent. (*In re Oetiker, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); In re*

Grabiak, 769 F.2d 729, 733, 226 U.S.P.Q. 870, 873 (Fed. Cir. 1985)).

A *prima facie* case of obviousness is established when the teachings of the prior art itself suggest the claimed subject matter to a person of ordinary skill in the art. (*In re Bell, 991 F.2d 781, 783, 26 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1993)*). To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed invention and the reasonable expectation of success must both be found in the prior art, and not based on Appellant's disclosure. (*MPEP § 2142*).

C. CLAIMS 7 and 14

As described above, the Examiner has failed to show that *Khosravi* discloses, teaches or suggests a probability function indicating a probability that a pixel belongs within a selected one of a plurality of segments, as recited in independent Claims 1 and 8, from which Claims 7 and 14 depend respectively. In addition, *Khosravi* does not disclose, teach or suggest enhancing a parameter of the pixel as a function of the probability function, as also recited in Claims 1 and 8. The Examiner does not cite *Gossett* as disclosing, teaching or suggesting these elements of Claims 1 and 8.

As a result, Claims 1 and 8 are patentable, and Claims 7 and 14 are patentable due to their

dependence from allowable base claims. Accordingly, the Appellants respectfully request that the § 103 rejection of Claims 7 and 14 be withdrawn and that Claims 7 and 14 be passed to allowance.

CONCLUSION

The Appellants have demonstrated that the present invention as claimed is clearly distinguishable over the prior art cited of record. Therefore, the Appellants respectfully request the Board of Patent Appeals and Interferences to reverse the final rejection of the Examiner and instruct the Examiner to issue a notice of allowance of all claims.

The Appellants have enclosed a check in the amount of $330.00 to cover the cost of this Appeal Brief. The Appellants do not believe that any additional fees are due. However, the Commissioner is hereby authorized to charge any additional fees (including any extension of time fees) or credit any overpayments to Davis Munck Deposit Account No. 50-0208.

Respectfully submitted,

DAVIS MUNCK, P.C.

Date: Oct. 20, 2004

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APPENDIX A

PENDING CLAIMS

1. An apparatus for performing segmentation-based enhancements of a video image, said apparatus comprising:

an input buffer for storing video frames of an incoming video signal;

a segmentation controller capable of segmenting a first stored frame into a plurality of segments, each of said plurality of segments comprising a plurality of pixels having at least one common property;

an image processor capable of calculating a probability function associated with at least one pixel in said first stored frame, said probability function indicating a probability that said at least one pixel belongs within a first selected one of said plurality of segments; and

an enhancement controller capable of enhancing a parameter of said at least one pixel as a function of said probability function of said at least one pixel.

2. The apparatus as set forth in Claim 1 wherein said segmentation controller segments said first stored frame into said plurality of segments as a function of said probability function.

3. The apparatus as set forth in Claim 2 wherein said enhancement controller increases an amount of enhancement of said parameter as a value of said probability function increases.

4. The apparatus as set forth in Claim 3 wherein said enhancement controller decreases an amount of enhancement of said parameter as a value of said probability function decreases.

5. The apparatus as set forth in Claim 1 further comprising a memory capable of storing a segmentation algorithm, said segmentation algorithm comprising instructions executable by said segmentation controller for segmenting said first stored frame into said plurality of segments.

6. The apparatus as set forth in Claim 5 wherein said memory is further capable of storing an enhancement algorithm, said enhancement algorithm comprising instructions executable by said enhancement controller for enhancing said parameter of said at least one pixel.

7. The apparatus as set forth in Claim 1 wherein said probability function associated with at least one pixel is calculated from the (y,u,v) color values associated with said at least one pixel.

8. A television receiver comprising:

demodulation circuitry capable of receiving an incoming RF television signal and generating therefrom a baseband video signal capable of being displayed as a plurality of pixels on a video display; and

post processing circuitry, coupled to an output of said demodulation circuitry and receiving therefrom said baseband video signal, capable of performing segmentation-based enhancements of a video image, said post processing circuitry comprising:

an input buffer for storing video frames of an incoming video signal;

a segmentation controller capable of segmenting a first stored frame into a plurality of segments, each of said plurality of segments comprising a plurality of pixels having at least one common property;

an image processor capable of calculating a probability function associated with at least one pixel in said first stored frame, said probability function indicating a probability that said at least one pixel belongs within a first selected one of said plurality of segments; and

an enhancement controller capable of enhancing a parameter of said at least one pixel as a function of said probability function of said at least one pixel.

9. The television receiver as set forth in Claim 8 wherein said segmentation controller segments said first stored frame into said plurality of segments as a function of said probability function.

10. The television receiver as set forth in Claim 9 wherein said enhancement controller increases an amount of enhancement of said parameter as a value of said probability function increases.

11. The television receiver as set forth in Claim 10 wherein said enhancement controller decreases an amount of enhancement of said parameter as a value of said probability function decreases.

12. The television receiver as set forth in Claim 8 further comprising a memory capable of storing a segmentation algorithm, said segmentation algorithm comprising instructions executable by said segmentation controller for segmenting said first stored frame into said plurality of segments.

13. The television receiver as set forth in Claim 12 wherein said memory is further capable of storing an enhancement algorithm, said enhancement algorithm comprising instructions executable by said enhancement controller for enhancing said parameter of said at least one pixel.

14. The television receiver as set forth in Claim 8 wherein said probability function associated with at least one pixel is calculated from the (y,u,v) color values associated with said at least one pixel.

15. A method of performing segmentation-based enhancements of a video image comprising the steps of:

storing video frames of an incoming video signal in an input buffer;

segmenting a first stored frame into a plurality of segments, each of the plurality of segments comprising a plurality of pixels having at least one common property;

calculating a probability function associated with at least one pixel in the first stored frame, the probability function indicating a probability that the at least one pixel belongs within a first selected one of the plurality of segments; and

enhancing a parameter of the at least one pixel as a function of the probability function of the at least one pixel.

16. The method as set forth in Claim 15 wherein the step of segmenting segments the first stored frame into the plurality of segments as a function of the probability function.

17. The method as set forth in Claim 16 wherein the step of enhancing increases an amount of enhancement of the parameter as a value of the probability function increases.

18. The method as set forth in Claim 17 wherein the step of enhancing decreases an amount of enhancement of the parameter as a value of the probability function decreases.

19. Computer-executable instructions stored on a computer-readable storage medium and capable of performing segmentation-based enhancements of a video image, the computer-executable instructions comprising the steps of:

storing video frames of an incoming video signal in an input buffer;

segmenting a first stored frame into a plurality of segments, each of the plurality of segments comprising a plurality of pixels having at least one common property;

calculating a probability function associated with at least one pixel in the first stored frame, the probability function indicating a probability that the at least one pixel belongs within a first selected one of the plurality of segments; and

enhancing a parameter of the at least one pixel as a function of the probability function of the at least one pixel.

20. The computer-executable instructions stored on a computer-readable storage medium as set forth in Claim 19 wherein the step of segmenting segments the first stored frame into the plurality of segments as a function of the probability function.

21. The computer-executable instructions stored on a computer-readable storage medium as set forth in Claim 20 wherein the step of enhancing increases an amount of enhancement of the parameter as a value of the probability function increases.

APPENDIX B

***Khosravi* Reference**

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